

HUMAN BEHAVIOUR RECOGNITION, IDENTIFICATION, AND COMPUTER INTERACTION

Edited by

Othman Omran Khalifa, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Shihab A. Hameed, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Sheroz Khan, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

HUMAN BEHAVIOUR RECOGNITION, IDENTIFICATION AND COMPUTER INTERACTION

Edited by

Othman Omran Khalifa, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Shihab A. Hameed, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Sheroz Khan, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Cataloguing-in-Publication Data Perpustakaan Negara Malaysia

ISBN: 978-967-418-156-7

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

CONTENTS

	Page No.
Part-I Human Posture Recognition	
Chapter 01 Human Posture Recognition: An Overview <i>Othman O. Khalifa, Kyaw Kyaw Htike, Aisha-Hassab Abdalla and Lai Weng Kin</i>	1
Chapter 02 Human Posture Recognition: Literature review <i>Othman O. Khalifa, Kyaw Kyaw Htike, Lai Weng Kin and A. A. Alkhazmi</i>	7
Chapter 03 Theoretical Background of Human Posture Recognition <i>Kyaw Kyaw Htike, Othman O. Khalifa, Sheroz Khan and Lai Weng Kin</i>	15
Chapter 04 Human Posture Recognition Classifiers <i>Kyaw Kyaw Htike, Othman O. Khalifa, Lai Weng Kin and MD Rafiqul Islam</i>	22
Chapter 05 Human Posture Recognition: Methodology and Implementation <i>Kyaw Kyaw Htike, Othman O. Khalifa, and Lai Weng Kin</i>	32
Chapter 06 Human Posture Recognition Database and Preprocessing Simulation Results <i>Kyaw Kyaw Htike, Othman O. Khalifa, Rashid Abdallah and Lai Weng Kin</i>	39
Chapter 07 Human Posture Recognition Results using Database A <i>Kyaw Kyaw Htike, Othman O. Khalifa and and Lai Weng Kin</i>	49
Chapter 08 Human Posture recognition Implementation and Deployment <i>Kyaw Kyaw Htike, Othman O. Khalifa and and Lai Weng Kin</i>	58
Chapter 09 Review on Hand Gesture Recognition <i>Sara Bilal and Rini Akmeliawati</i>	68
Chapter 10 Computational Intelligence techniques for Hand Gesture Recognition <i>Sara Bilal and Rini Akmeliawati</i>	77
Chapter 11 Feature Extraction: Hand Shape, Hand Position and Hand Trajectory Path <i>Sara Bilal and Rini Akmeliawati</i>	85
Chapter 12 Towards Malaysian Sign Language Database <i>Haris Al Qodri Maarif, Sara Bilal and Rini Akmeliawati</i>	92
Chapter 13 The Development of Malaysian Sign Language Translator : Preliminary results <i>Sara Bilal, Haris Al Qodri Maarif and Rini Akmeliawati</i>	100
 Part II Human Path Detection for Video Surveillance Systems	
Chapter 14 Introduction to Intelligent Video Surveillance Systems <i>Othman O. Khalifa, Imran Moez Khan, Yusof Zaw Zaw and Lai Weng Kin</i>	107
Chapter 15 Human Path Detection : A review <i>Imran Moez Khan, Othman O. Khalifa, Yusof Zaw Zaw, Sheroz Khan and Lai Weng Kin</i>	113

Chapter 16	Fuzzy Set Theory <i>Imran Moez Khan, Yusof Zaw Zaw and Othman O. Khalifa</i>	129
Chapter 17	The Mamdani Fuzzy Inference Algorithm <i>Imran Moez Khan, Yusof Zaw Zaw, Othman O. Khalifa and Lai Weng Kin</i>	138
Chapter 18	Human Path Classifier Architecture <i>Imran Moez Khan, Yusof Zaw Zaw, Othman O. Khalifa and Lai Weng Kin</i>	145
Chapter 19	Human Motion Detection and Classification <i>Othman O. Khalifa, Mat Kamil Awang and Aisha-Hassan Abdulla</i>	154
Chapter 20	Real-Time Human Detection for Video Surveillance <i>Fadhlan H. Kamaru Zaman, Amir A. Shafie and Othman O. Khalifa</i>	163
Chapter 21	Human Tracking Algorithm for Video Surveillance <i>Fadhlan H. Kamaru Zaman, Amir A. Shafie and Othman O. Khalifa</i>	178

Part- III Human Identification and Computer Interaction

Chapter 22	Automatic Identity Recognition Systems: A Review <i>Assal A. M. Alqudah,, Roziati Zainuddin, Mohammad A. M. Abushariah, and Othman O. Khalifa</i>	192
Chapter 23	An Application of Biometric Technology: Iris Recognition <i>Othman O Khalifa, Rashidah F. Olanrewaju and Mohd Fariz Ramli</i>	206
Chapter 24	Interactive Voice Response Technology for Telephony System <i>Mohammad A.M. Abu Shariah, R.N. Ainon and Othman O. Khalifa</i>	213
Chapter 25	EMG Signal Classification Techniques For The Development Of Human Computer Interaction System <i>Md. Rezwanul Ahsan, Muhammad Ibn Ibrahimyand Othman Omran Khalifa</i>	224
Chapter 26	English Digits Speech Recognition System Based on Hidden Markov Models <i>Teddy S. Gunawan, Ahmad A. M. Abushariah, Othman O. Khalifa</i>	244
Chapter 27	Signature Recognition Using Artificial Neural Network <i>Ahmad A. M. Abushariah, Teddy S. Gunawan, Othman O. Khalifa, and Jalel Chebil</i>	255
Chapter 28	Speaker Recognition Using Mel Frequency Cepstrum <i>Othman O. Khalifa, S. Khan, MD. Rafidul Islam, M. Faizal and D. Dol</i>	263
Chapter 29	Handwritten Arabic Word/Character Recognition: Common approaches <i>Assma O. H. , Othman Khalifa and Aisha Hassan</i>	289
Chapter 30	Speaker's Variabilities, Technology and Language Issues that Affect Automatic Speech and Speaker Recognition Systems <i>Mohammad A. M. Abushariah, Roziati Zaimuddin, Assal A. M. Alqudah, and Othman O. Khalifa</i>	298

Chapter 31	Arabic Automatic Continuous Speech Recognition Systems <i>Mohammad A. M. Abushariah, Roziati Zainuddin, Assal A. M. Alqudah, and Othman O. Khalifa</i>	306
Chapter 32	Face Verification : An Introduction <i>Shihab A. Hameed, Waleed A. Badurik</i>	317
Chapter 33	Introduction to Fingerprint Verification <i>Shihab A. Hameed, Waleed A. Badurik</i>	326
Chapter 34	Protein Coding Identification using Modified Gabor Wavelet Transform on Multicore Systems <i>Teddy Surya Gunawan</i>	334
Chapter 35	Current Trend in Image Guided Surgery (IGS) <i>Abdulfattah A. Aboaba, Shihab A. Hameed, Othman O. Khalifa, Aisha H. Abdalla</i>	344

Chapter 17

The Mamdani Fuzzy Inference Algorithm

Imran Moez Khan¹, Yusof Zaw Zaw¹, Othman O. Khalifa¹ and Lai Weng Kin²

¹Department of Electrical and Computer Engineering,

Faculty of Engineering

International Islamic University Malaysia, Jalan Gombak, 53100 Kuala Lumpur, Malaysia

electronicluddite@gmail.com, yusof.8k.com@gmail.com, khalifa@iium.edu.my

²Center for Advanced Informatics, MIMOS Berhad

Technology Park Malaysia 54000, Kuala Lumpur, Malaysia

lai@mimos.my

17.1 Introduction

Fuzzy logic is simply the operations of fuzzification, conjunction, disjunction, complement, defuzzification etc. on fuzzy sets. It is generally carried out using the degree of membership that has been discussed so far. The fuzzification step is usually performed on data being input into a system. In the Mamdani fuzzy inference methodology this fuzzified input data to trigger a number of weighted IF-THEN rules that govern the system's behaviour. The firing strength of these rules is determined by separate steps that can also be optimized for design. After individual firing strengths are computed, they are then fed into the system function and the final system output is determined by a defuzzification step. All steps of the Mamdani fuzzy inference method are shown in figure 17.1 and explained in the sections that follow.

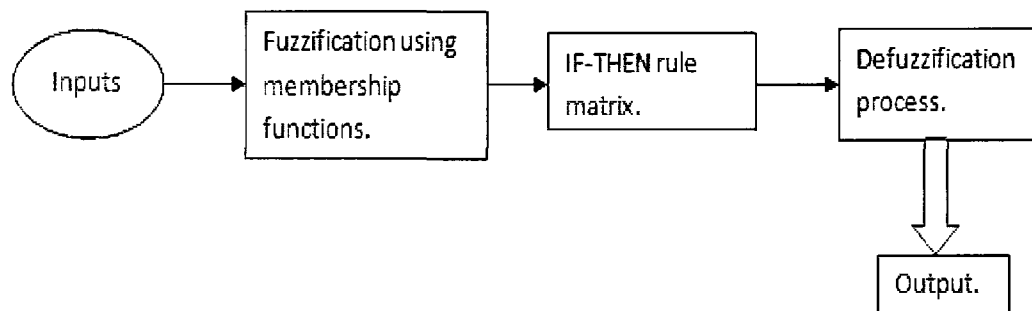


Figure 17.1 Mamdani fuzzy inference method.